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Four hundred and twenty-ninth meeting.

August 13, 1856. — STATED MEETING.

The PRESIDENT in the chair.

Professor Treadwell, from the committee on the subject of meteorological observations, reported that Mr. Hall's observations are in due process of preparation for the press.

Professor W. B. Rogers made the following communication : —

“ Proofs of the Protozoic Age of some of the Altered Rocks of Eastern Massachusetts, from Fossils recently discovered.

“ It is well known that the altered slates and gritty rocks which show themselves interruptedly throughout a good part of Eastern Massachusetts, have, with the exception of the coal-measures on the confines of this State and Rhode Island, failed hitherto to furnish geologists any fossil evidences of a paleozoic age, although from aspect and position they have been *conjecturally* classed with the system of rocks belonging to this period. Indeed, the metamorphic condition of these beds generally, traceable no doubt to the sienitic and other igneous masses by which they are traversed or enclosed, would naturally forbid the expectation of finding in them any distinguishable fossil forms.

“ Lately, through the kindness of Peter Wainwright, Esq., residing in the neighborhood, I have been led to examine a quarry in the belt of siliceous and argillaceous slate which lies on the boundary of Quincy and Braintree, about ten miles south of Boston, and, to my great surprise and delight, I found it to be *a locality of trilobites*.

“ It appears that for several years past the owner of the quarry, Mr. E. Hayward, and his family, have been aware of the existence of these so-called *images* in the rock, which from time to time they have quarried as a ballasting-material for wharves; but *until now the locality has remained entirely unknown to science*.

“ The fossils are in the form of casts, some of them of great size, and lying at various levels in the strata. So far as I have yet explored the quarry, they belong chiefly, if not altogether, to one species, which, on the authority of Professor Agassiz, as well as my own comparison with Barrande's descriptions and figures, is a species of *Paradoxides*. Of its specific affinities I will not now speak, further

than to remark that the specimens agree more closely with Barrande's *P. spinosus* than with any other form which I have seen figured or described.

"The rock in which these fossils occur is a compact, dense, rather fine-grained silico-argillaceous slate or slaty sandstone, containing little or no carbonate of lime. In the quarry it displays two systems of joints, in one of which are seen the usual parallel markings due to the movement of contiguous surfaces upon each other under pressure, and it is much broken up by irregular cleavage planes. The strike of the beds appears to be about N. 70° E., and their dip towards the north and west at an angle of about fifty degrees. The narrow belt of slates and grits, of which the fossiliferous strata form a part, extends for some distance towards the north and east, and has also, it is said, been traced for several miles in the opposite direction. But as yet the discovery of fossils has been confined to the one locality.

"In crossing the belt either towards the northwest or in the opposite direction, we find the slates and grits to become more indurated and otherwise modified, after which, passing into beds of a semi-crystalline character, they give place to ranges of sienite. Thus the fossiliferous belt in this part of its course *is actually included between great masses of igneous rocks*; and it is not a little surprising, that, under conditions so favorable for metamorphic action, the fossil impressions should have been so well preserved.

"In regard to the distribution of the genus *Paradoxides*, Barrande, in his great work the '*Système Silurien de la Bohème*,' has the following important observations:—

"'In Bohemia the genus *Paradoxides* characterizes exclusively the primordial Fauna, and does not extend beyond our protozoic schists (C). The twelve species which we have determined divide themselves almost equally between the two slaty belts of Ginetz and Skrey, and two are common to them both. In these two belts we find *P. spinosus* in all the localities which have afforded fossils, while each of the other species is restricted to a few points, principally those of Ginetz and Skrey.

"'In Sweden the *Paradoxides* belong exclusively to the local formations designated by Angelin as Regions A and B, representing jointly our protozoic slate formation (C) above mentioned. The region A is the lowest fossiliferous belt of Sweden, as it rests directly on the azoic rocks.

“‘In Great Britain we know, according to the papers of Mr. Salter, that Paradoxides has been found in the Trappean group (Lingula flags of the Survey), which is the *oldest fossiliferous rock* of Wales, resting on the azoic sandstones of Harlech and Barmouth. There is therefore a perfect agreement in these three regions as to the geological horizon of the genus now under consideration. This agreement acquires still further importance from the affinities displayed equally and everywhere by the other types which accompany the Paradoxides; for instance, in Sweden we have Olenus and Conocephalites; in England, Olenus as recognized in the Trappean group.’

“As thus the genus Paradoxides is peculiar to the lowest of the paleozoic rocks in Bohemia, Sweden, and Great Britain, marking the primordial division of Barrande and the Lingula flags of the British Survey, we shall probably be called upon to place the fossil belt of Quincy and Braintree on or near the horizon of our lowest fossiliferous group; that is to say, somewhere about the level of the primal rocks, the Potsdam sandstone, and the protozoic sandstone of Owen containing Dikelocephalus in Wisconsin and Minnesota. *Thus for the first time are we furnished with data for fixing conclusively the paleozoic age of any portion of this tract of ancient and highly altered sediments, and, what is more, for defining in regard to this region the very base of the paleozoic column, and that too by the same fossil inscriptions which mark it in various parts of the Old World.*

“Referring to the occurrence of Paradoxides in the protozoic rocks of Europe, Barrande observes: ‘The presence of this genus has not been satisfactorily proved in any other Silurian region, although this generic name has been applied to North American forms, such as Paradoxides Boltoni, P. Harlani, &c. The first of these is known to be a Lichas, and we know nothing of the others. The care with which J. Hall has described the trilobites of the Lower Silurian rocks of the country in question, is sufficient proof that he had not discovered any trace of Paradoxides at the time of publishing the first volume of the Paleontology of New York.’ I may add to this, that in no subsequent publication have I seen any reference to the finding of fossils of this genus in the rocks of North America.

“One of the most curious facts relating to the trilobite of the Quincy and Braintree belt is its seeming identity with the P. Harlani described by Green in his Monograph of North American Trilobites.

This description, which is quite imperfect, was made out from a specimen of *unknown locality*, procured, some twenty-five years ago, by Dr. Harlan, from the collection of our well-known mineralogist, Mr. Francis Alger. That it is the same with the more conspicuous of our Quincy fossils is, I think, established by the comparison of a nearly complete specimen of the latter with the cast of *P. Harlani* taken from Mr. Alger's specimen, the original never having been returned. Considering the perfect agreement in lithological characters of the matrix as described by Green with that of the Quincy fossils, and the immediate recognition of this identity of mineral features by Mr. Alger on seeing my Quincy specimens, we can hardly doubt that the original specimen of *P. Harlani* came, either directly or through the drift scattered in the vicinity, from the same fossiliferous belt. Thus it appears that this vagrant fossil, so long without a local habitation, although not without a name, has at length been restored to its native seat, where it takes a prominent place in the dynasty of ancient living forms that marked the earliest paleozoic history of New England.

"In this connection I find a remark in Barrande which, besides being historically curious, has an interesting bearing on the specific affinities of our fossil: 'We see in different collections, and especially in that of the School of Mines and the British Museum, under the name of *P. Harlani*, from the United States, a cast of a trilobite which appears to us to be identical with *P. spinosus*, of great size, such as found at Skrey in Bohemia.' The cast here referred to, like that used in my comparison with the Quincy fossil, was doubtless one of the series of plaster copies prepared by Dr. Green to accompany his monograph. Its agreement with the *P. spinosus* harmonizes well with my own observation, already stated, of the close resemblance between the Quincy fossil and this Bohemian species.

"The occurrence of well-preserved fossils among rocks so highly altered, and so contiguous to great igneous masses, as are the fossiliferous slates of Quincy, may well encourage us to make careful search in other parts of New England where heretofore such an exploration would have been deemed useless. Although we cannot hope to build up the geological column of New England from the protozoic base just established to the carboniferous rocks, supposing all the intervening formations to be represented in this region, we may at least succeed in determining, by fossils hereafter discovered, some of the principal stages in its structure, and in thus relating its strata definitely to the great paleozoic divisions of our Appalachian geology."

Professor Agassiz expressed his great satisfaction at the announcement of Professor Rogers. Geologically speaking, its importance could hardly be over-estimated. We have now, he remarked, a standard level upon which to build up the formation of the metamorphic rocks. It also confirms the universal law, as elsewhere illustrated, of the creation and development of animal life.

Dr. Kneeland presented, in the name of Dr. Augustus C. Hamlin, of Bangor, Maine, very perfect casts of an inscription, supposed to be Runic, upon a rock on an island near Monhegan, Maine.

Dr. Jenks expressed his gratification at having at last an opportunity of examining so perfect a copy of the inscriptions in question. He had not, although he had been quoted as so doing, given any decided opinion as to their character. Copies had been transmitted to Copenhagen, and he hoped before long information would be received which would throw light upon these interesting inscriptions.

The thanks of the Academy were voted to Dr. Hamlin for his valuable donation.

Professor Agassiz made a few remarks upon the *Orthogoriscus mola*, of which he had recently had an opportunity of dissecting a specimen. This fish, which has been well described by Dr. Storer, and figured by Dr. J. Wyman in the Journal of the Boston Society of Natural History, has been placed heretofore in the same family with Diodon and Tetraodon. Professor Agassiz found that its internal structure was such as to be entirely incompatible with such a classification. The stomach he has ascertained to be directly continuous with the intestine, without any indication of difference, either in form, or structure of the mucous membrane; the whole tract resembling a long hose from one orifice to the other. He therefore considered it as the type of a distinct family, but want of time prevented his going into further details of its anatomy.

Professor W. B. Rogers gave an explanation of the causes

of the motion of the Gyroscope, an instrument which is attracting considerable attention at the present time ; ascribing the credit of its invention to the late Professor Walter R. Johnson of Philadelphia.

Four hundred and thirtieth meeting.

September 8, 1856. — MONTHLY MEETING.

The PRESIDENT in the chair.

The Corresponding Secretary read letters from Thomas B. Cary, Rev. George E. Ellis, Charles J. Sprague, and John B. Henck, accepting their appointment as Associate Fellows.

A circular was read from the Committee on the Inauguration of the Statue of Franklin, inviting the Academy to join in the procession on the day of that ceremony. It was accordingly voted, —

“ That the Academy accept the invitation thus politely extended to them ; and that the Committee for placing the Statue be invited to make use of the rooms of the Academy as a place of rendezvous on the day of inauguration, Franklin himself having been one of the earliest Fellows of the Academy.”

Dr. Durkee exhibited to the Academy a box of specimens of gigantic *Scarabæidæ* from the vicinity of Gaboon River, Africa ; also specimens of *Platyphyllum concavum* (Katydid), of both sexes, obtained in Milton, Mass. ; also *Spectrum femoratum*.

Professor J. Lovering read, in behalf of Colonel Emory, by title, a “ Memoir containing the Results of Magnetic Observations not yet published ; and combining the Results of all the Magnetic Observations made under my Orders in the United States and Mexican Boundary Commission. By Colonel W. H. Emory.” This memoir was referred to the Committee of Publication.

Dr. Jenks read a highly interesting letter, written on July 21, 1781, by Dr. Richard Price, to President Joseph Willard, who